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## Psychological Consequences of Screening for Abdominal Aortic Aneurysm and Conservative Treatment of Small Abdominal Aortic Aneurysms\*

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**Objective:** to describe the potential psychological consequences of screening for abdominal aortic aneurysms (AAAs).

**Methods:** the participants were prospectively and randomly sampled from a randomised screening trial for AAA and asked to complete a validated generic and global anonymous quality of life (QL) questionnaire by self-assessment (ScreenQL).

**Material:** case-control study: ScreenQL was completed once by 168 (48%) of 350 non-responders to screening, 271 (81%) of 335 attenders before screening, 286 (85%) of 335 attenders after screening, 127 (85%) of 149 with a small AAA diagnosed at screening, and 231 (66%) of 350 who were randomised not to be offered screening for AAA (controls). Prospective study (paired data): 127 men having a small AAA diagnosed. Twenty-nine (81%) of 36 men operated after initial conservative treatment.

**Results:** initially, the QL score was 5% lower among men with a small AAA compared to the controls ( $p < 0.05$ ), mainly because of poorer health perception. The QL score declined significantly further to 7% below control values during the period of conservative treatment. This impairment was mainly due to a 21% and 15% reduction in scores relating to health perception and psychosomatic distress, respectively. However, all scores improved to control levels in patients operated on. The QL of attending men for screening was significantly lower than that of the controls and the attenders after the screening. No differences were noticed concerning the non-attenders.

**Conclusion:** the offer of screening causes transient psychological stress in subjects found not to have AAA. However, diagnosis of an AAA seems to impair QL permanently and progressively in conservatively treated cases. This impairment seems reversible by operation. Nevertheless, the impairment seems considerable, and must be considered in the management of AAA and in the final evaluation of screening for AAA.

**Key Words:** Abdominal aortic aneurysm; Quality of life; Mass screening; Surveillance.

### Introduction

The effects of a screening programme are traditionally evaluated in terms of mortality, morbidity, and saved years of life. However, screening has recently been shown to reduce quality of life (QL). There are also personal economic costs associated with prevention demanding changes in lifestyle: such as in general health screening for cardiovascular risk,<sup>1</sup> arterial hypertension,<sup>2,3</sup> and hypercholesterolaemia.<sup>4</sup> Psychological consequences have also been noticed in screening for breast<sup>5,6</sup> and cervical cancer.<sup>7</sup>

Even in those screened and found not to have the disease, the screening process reminds people about the possibility of having a serious disease without

feeling ill, and of their mortality.<sup>8</sup> Consequently, a careful evaluation of the psychological consequences of screening has been suggested<sup>8,9</sup> and, in Denmark, demanded.

The psychological consequences of screening for abdominal aortic aneurysms (AAAs) are almost unknown. However, the large UK Small Aneurysm Trial recently suggested that the conservative treatment of AAA was associated with impaired-health-related QL.<sup>10</sup> The Gloucestershire Aneurysm Screening Programme examined 161 attenders, and concluded that the offer of screening produced transient, mild anxiety but did not cause unacceptable psychological morbidity when an AAA was diagnosed.

### Material and Methods

In 1994, personal ID numbers, names, and addresses of all 8887 65–73-year-old males in the county of Viborg

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were obtained. After randomisation, 4404 were invited to ultrasonographic screening at their nearest hospital. The invitations were sent 1 month before the offered time of screening. The invitation allowed for a change of appointment or refusal of the screening offer. Non-responders were re-invited once. Men who responded to the first invitation were called primary attenders, those who attended only after changed appointment or re-invitation were secondary attenders. The procedure is described in more detail elsewhere.<sup>11–13</sup>

After randomisation, 15% of the 4404 invited men also received an anonymous QL questionnaire (ScreenQL) to be completed at home and delivered at screening. Furthermore, 10% of the invited men were randomised to receive ScreenQL, together with a franked addressed envelope, one month after the scan. ScreenQL was also sent, together with franked addressed envelope, to the following groups: a random sample of 350 men from the group of controls; a random 33% sample of non-attenders, 1 month after non-attendance; the 149 men in whom small AAAs were diagnosed at screening in the period of 1994–96, 1 month after the diagnosis.

The 149 men in whom small AAAs were diagnosed at screening in the period of 1994–96 received ScreenQL, 1 month after the diagnosis, one month before annual surveillance for aneurysmal expansion, and 3–6 months after operation. A small AAA was defined as being an infrarenal aortic diameter between 3 and 5 cm. Wilcoxon's rank-sum test and Mann-Whitney test were used for statistical analyses. The basic scores from the controls were used as reference to express relative differences. The ScreenQL questionnaire is a validated generic and global QL questionnaire with 24 items based upon reported psychological consequences of screening and existing questionnaires, and evaluating six categories: general self-assessed quality of life (summary score), emotional, physical health, psychosomatic distress, social and family functions, and marriage. The summary score is the sum of the individual categories. A large validation study involving 2500 normal grown-up Danes aged 18–88 years showed high external and internal reliability (Cronbach's alpha 0.65, Siegel's test: all domain correlations >0.70), reproducibility ( $R=0.86$ ), sensitivity (61 respondents needed to detect 3% difference in QoL score), and acceptable correlations to Sickness Impact Factor ( $R=0.74$ ), self estimation of QoL (SEQOL – an extensive global and generic QL measurement) ( $R=0.65$ ) and Nottingham Health Profile ( $R=0.68$ ).

Wilcoxon's rank-sum test was used for unpaired data (case-control study), and Mann-Whitney's rank-sum tests for paired data (prospective study). In order

to minimise the risk of chance findings, the tests concerning the subdomains were only performed when the test of respective summary QL score showed significant differences.

## Results

Of the 4404 invited men, 3344 attended (76%), and 1060 did not attend. Of these non-attenders, 348 received a QL questionnaire. Two hundred and thirty-three were non-responders, while 115 had refused the offer of screening; the response rates were 39% and 67%, respectively. In all, 168 answered (48%).

QL questionnaires were completed by the following: 271 (81%) of the men who came to the screening with the questionnaire; 286 (85%) of the 336 men who were asked to complete a questionnaire one month after the scan; 127 (85%) of 149 with a small AAA diagnosed at screening; 29 (81%) of 36 men were operated on after initially conservative treatment; and 231 (66%) of 350 who were randomised not to be offered screening for AAA (controls) completed the questionnaire.

Table 1 shows the means and non-parametric  $p$ -values of the various groups compared with the controls in the categories and QL score. Note that, in all categories, the highest scores are best, i.e. a high score in the psychosomatic distress category is a sign of low psychosomatic distress. Men with an AAA showed a lower QL score in the category of health ( $p<0.05$ ), and 5% lower QL score compared with the controls ( $p<0.05$ ). Attenders after screening showed significantly less psychosomatic distress, and non-significantly higher QL score than the controls (83.2 versus 81.4,  $p=0.32$ ). The QL score of attenders before screening was close to becoming significantly low ( $p=0.08$ ). No significant differences in the group of non-attenders were noticed, but there was a trend towards lower scores in the category of social/family ( $p=0.16$ ).

Table 2 compares the domains and QL scores between the groups. There were no differences between non-attenders and attenders before screening. QL scores were lower in attenders before screening than in attenders after screening.

Table 3 shows the results of the prospective study of initially conservatively treated patients with small AAAs. The QL score was 5% lower among men with a small AAA compared to the controls ( $p<0.05$ ); mainly because of poorer health perception and psychosomatic distress. This was impaired significantly further to 7% lower QL values during the period of conservative treatment. This impairment was mainly caused by poorer health perception and psychosomatic

**Table 1. Case-control study of quality of life scores among random samples of all invited (non-attenders and attenders before screening and subgroups of invited men) compared with non-invited controls.**

Domain	Controls <i>n</i> = 231	Invited <i>n</i> = 439	Non-attenders <i>n</i> = 168	Attenders before screening <i>n</i> = 271	Attenders after screening <i>n</i> = 286	AAA <i>n</i> = 106
Emotional	15.1	14.9	15.1	14.8	15.5	15.0
Health	15.7	15.3	15.5	15.2	16.1	14.4*
Psychosomatic distress	21.0	20.9	21.2	20.7	21.7	20.5
Social and family	10.3	10.1	9.9	10.2	10.6	10.4
Marriage	15.4	14.4	14.0	14.6	15.3	14.7
Quality of life	81.4	79.5	79.9	79.2	83.2	78.6*

Statistical tests concerning subdomains were only performed in case of significant test concerning overall QL score.

\*: Wilcoxon's rank-sum test comparison with the control group;  $p < 0.05$  (unpaired data).

Means scores are listed. Please notice that in all categories the highest scores are best. Consequently, a high score in the psychosomatic distress category is a sign of low psychosomatic distress.

**Table 2. Case-control study of quality of life among attenders and non-attenders compared between the groups.**

Domain	Non-attenders <i>n</i> = 168	$p^1$	Attenders before screening <i>n</i> = 271	$p^2$	Attenders after screening <i>n</i> = 286	$p^3$	AAA <i>n</i> = 106
Emotional	15.1		14.8	0.02*	15.5	0.22	15.0
Health	15.5		15.2	0.08	16.1	0.34	14.4
Psychosomatic distress	21.2		20.7	0.00*	21.7	0.00*	20.5
Social and family	9.9		10.2	0.07	10.6	0.63	10.4
Marriage	14.0		14.6	0.07	15.6	0.31	14.7
Quality of life	79.9	0.20	79.2	0.00*	83.2	0.00*	78.6

Statistical tests concerning subdomains were only performed in case of significant test concerning overall QL score.

$p^1$ : Wilcoxon's rank sum test between non-attenders and attenders before screening.

$p^2$ : Wilcoxon's rank sum test between attenders before and after screening.

$p^3$ : Wilcoxon's rank sum test between attenders after screening and the group of small AAAs.

\*: Wilcoxon's rank-sum test:  $p$ -value  $< 0.05$  (unpaired data).

distress. However, all scores improved the levels of the control group in cases operated on later because of expansion.

apart from the non-responders, which must be kept in mind.

### *Domains and quality of life*

## **Discussion**

### *Design and methods*

As in any case-control study, the risks are confounders and non-representative data due to selection. The selection to screening for AAA due to differences concerning co-morbidity and social class have been reported earlier in detail. Morbidity, higher social class, and marriage were independently associated to higher attendance.<sup>11</sup>

Because of ethical considerations, we did not send reminders to increase the response rate. The strategy to use a short and anonymous questionnaire seems successful, because the response rates seem acceptable

Whether statistically significant findings are clinically significant is a general scientific problem, especially in large studies. The problem becomes even more difficult with psychometric testing. However, the problem is different when you are inviting healthy people in from the street. In that situation, the question from an ethical point of view is not "how hard did you beat him?", but whether he was beaten or not. Permanent harm seems only acceptable in positive findings. Fortunately, our study only demonstrated potential permanent harm among positive findings. The degree of harm must be balanced with the other costs and benefits. Consequently, the relative differences were calculated. These differences are relevant for calculation of saved quality-adjusted living years.

Table 3. Prospective study of changes in quality of life during conservative treatment of AAA and after surgery.

Domain	First observation	Difference	Last observation	Difference	After surgery	Controls
Emotional	15.1	−0.67%	15.0	+8.07%	16.2	15.10
Health	14.6	−7.92%*	13.6	+15.2%*	15.6	15.7
Psychosomatic distress	20.7	−17.3%*	18.1	+9.33%*	19.5	21.0
Social and family	10.3	−1.00%	10.0	+9.67%	10.9	10.3
Marriage	15.7	−1.43%	15.3	+7.56%	16.7	15.4
Quality of life	79.6	−2.06%*	78.3	+6.97%*	82.7	81.4

Second column: initial observations.

Third column: relative difference between first and last observation during ultrasonographic surveillance (\*:  $p < 0.05$  by Mann–Whitney test).

Fourth column: observation 3–6 months after surgery.

Fifth column: relative difference between last observation during ultrasonographic surveillance and observation 3–6 months after surgery.

Statistical tests concerning subdomains were only performed in case of significant test concerning overall QL score.

\* $p < 0.05$  by Mann–Whitney test (paired data).

The absence of signs of decreased QL in the non-attenders might be due to the low response rates. However, there was an acceptable response rate by the men who refused the screening offer, and they showed no signs of decreased QL. It may also be due to lower morbidity. Unfortunately, we cannot conclude that the offer of screening did not reduce their QL, because we did not know their QL before they received the invitation. However, it was similar to that of the controls.

The finding of lower QL in attenders before screening suggests that the offer of screening provides psychological stress. An alternative explanation would be that those attending screening have a higher anxiety level than the non-attenders, or that they have a higher co-morbidity. However, the finding of insignificantly higher QL after screening, compared with the controls, and significantly higher than before the screening, suggests a possible psychological stress that disappears within a month of screening. If indeed the QL increases after screening, this might be because they see their normal scan as a “certificate of health”.<sup>1,8</sup> In younger populations such a “certificate” could be believed to be a negative “side-effect”, because the attenders see a positive conclusion of a health check as permission to continue an unhealthy lifestyle. In this older population, it must be questioned whether such a “certificate of health” is a negative side-effect, because changes in lifestyle are unlikely, and the potential health benefits small. The psychological consequences of screening for AAA have been partly studied once before in a small case–control study.<sup>14</sup> Apart from transient psychological stress, no other changes were noticed. This could be explained by the use of an unspecific QL questionnaire not focusing upon the relevant topics, and the use of parametric statistical tests.

The lower QL scores of men with a small AAA

might, at least partly, be caused by higher morbidity.<sup>12</sup> If not, screening decreased their QL 5%. There is no consensus of the acceptable loss of QL due to screening. However, the impairment seems to be permanent and progressive in conservatively treated cases but totally reversible by operation, indicating that the diagnosis causes psychological distress. The UK Small Aneurysm Trial made similar observations.<sup>10</sup> The findings seem logical; the patients were stigmatised by the diagnosis, but were not offered any treatment. Development of pharmacological treatments or reliable predictive tools to identify those who must be treated seem to be the only solutions to solve the problem in the management of small AAAs.

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